Modular panels for making a swimming pool

The invention relates to the technical field of elements for building swimming pools.

More specifically, the invention relates to panels of the type described in Patent FR 2 765 909 of which the applicant of this patent is also the proprietor.

It will be recalled, for a better understanding of the remainder of the description, that each panel is made from a prefabricated structure of rectangular overall shape having a peripheral surround delimiting in particular vertical flanges for assembly with adjacent modular panels. Each structure has a width which is small by comparison with its height. Advantageously, the structure receives an independent reinforcing element shaped in terms of cross section to receive, over the entirety of its height, concrete communicating with wall ties.

For example, the reinforcing element has a cross section able to define a vertical channel in communication with a right-angled rim, so that the said channel and the said rim receive concrete in combination with the wall ties. The vertical channel is advantageously formed between two bearing and fixing flanges situated in one and the same plane so that the reinforcing element can be fixed between the vertical assembly flanges of the structure.

The teachings of Patent FR 2 765 909 disclose particular arrangements for assembling the various structures with one another instantly without the need to employ attached assembly elements of the screw or some other type.

To this end, according to the teachings of this earlier

state of the art, one of the vertical flanges of the structure has, over its entire height, quick-assembly means of the clip-together type, collaborating with complementary means exhibited by the other flange. These assembly means of the clip-together type consist of tongues which, at their ends, have a catching region collaborating with open openings formed in the thickness of the other flange, in correspondence.

This method of assembly affords significant advantages over the assembly systems known from the prior art. However, the means of assembly of the clip-together type are not entirely satisfactory. For example, in order to engage the clip-together tongues in the open openings, it is necessary to offer the structure up obliquely and to fold it through an angle, with the assembly flanges contiguous. It is also often necessary to use a member of the pliers type to make sure that the tongues clip perfectly into the openings.

This form of assembly also requires the provision of special arrangements to ensure sealing. The design of the mould for obtaining this type of panel involves movements resulting from the presence of inserts or carriages needed for releasing certain parts of the panel, particularly of the assembly means, from the mould. This results in problems of fit tolerance which, after assembly, create problems of flatness on the flat faces of the structure accommodating the liner.

Starting out from this state of the art, still with the goal of being able to assemble the various modular elements instantly without the need to employ any attached assembly members, the problem that the invention sets out to solve is that of simplifying this method of assembly while at the same time having the goal of obtaining a perfectly sealed assembly and perfect flatness after assembly with the possibility of achieving assembly entirely automatically using

appropriate machines or entirely manually.

To solve such a problem, a panel for producing swimming pools has been designed and developed which has:

- a prefabricated flat structure of rectangular overall shape and delimited by a peripheral surround consisting of vertical flanges and horizontal flanges;
- one of the vertical flanges has, suitably distributed over its height, fixing arrangements able to collaborate with complementary arrangements on the other flange of an adjacent panel;
- the complementary arrangements are selected, on the one hand, to allow the panels to fix together automatically after the said arrangements have been engaged, under a pressing force exerted in a plane parallel to the vertical flanges and, on the other hand, to ensure sealing in combination with a shaped form produced over the entire height of the vertical flanges at their part for connection with the flat face of the structure.

To solve the set problem of assembling the structures with one another, under a force exerted in a plane parallel to the vertical flanges, while at the same time centring and ensuring automatic fixing of the said structures:

- the complementary arrangements and consist, in the case of one of the flanges, of tabs formed in the thickness of the said flange and able to be engaged in centring and guiding shapes belonging to the other flange,
- each of the tabs has, on its outer face, anchoring roughnesses able to collaborate with complementary roughnesses after engagement in the said shapes, to ensure non-dismantleable self-locking,
- the centring and guiding shapes constitute a well or sleeve formed as an overspill from the bearing face of the flange and the cross section of which corresponds

approximately to that of the tabs,
- the part of the flange from which the said sleeves are formed have anchoring roughnesses so that when the tabs have been engaged in the sleeves a wedging effect is produced for imbricating the roughnesses,
- a profiled shape is established over the entire height of the vertical flanges and at their part for connection with the flat face of the structure, to ensure sealing once the tabs have been engaged in the sleeve.

To solve the set problem of locking the structures together after assembly without the risk of them becoming uncoupled, the anchoring roughnesses consist of a number of straight and parallel very closely-packed teeth of the gullet tooth type.

Advantageously, the anchoring tabs result from two parallel cut-outs formed at right angles from the longitudinal edge of the corresponding flange, the length of the said tabs being less than the width of the said flange.

The anchoring tabs are of flat cross section, the internal cross section delimited by the edges of the sleeve being rectangular, the free end of the anchoring tabs is chamfered.

To solve the set problem of sealing the panels after the structures have been assembled, the profiled sealing form consists of a bead resulting from an additional thickness of material.

Another problem that the invention sets out to solve is that of having the upper edge of the structure to which in particular the liner is attached perfectly aligned. To this end, the width of the anchoring tabs is less than the width of the internal section of the sleeves except for the sleeve situated at the upper part of the

structure considered in a vertical position, and of which the width of its internal section corresponds approximately to that of the tabs so as to allow heightwise adjustment of the said panels.

To solve the set problem of rationalizing manufacture and reducing costs, the entirety of the structure is obtained directly by the injection-moulding of a plastic.

According to another important feature of the invention, the internal face of the structure is equipped, directly at the time of its manufacture, with studs having a head and a centring part able to collaborate with a necked aperture exhibited by an independent reinforcing element acting as wall tie and hollow shaft for the pouring of concrete, the said studs and apertures being distributed over the entire height of the structure.

The invention is set out hereinbelow in greater detail with the aid of the figures of the appended drawings in which:

- Figure 1 is a view in perspective prior to assembly of the basic structure of the panel and of the reinforcing element;
- Figure 2 is a view in perspective of the basic structure of the panel equipped with the attached reinforcing element;
- Figure 3 is a view in perspective, of a schematic nature, prior to assembly of two structural elements;
- Figure 4 is a view corresponding to Figure 3, after assembly of the two elements;
- Figure 5 is - on a larger scale - a view in cross section of the structural elements prior to assembly;
- Figure 6 is a view corresponding to Figure 5, after assembly of the two elements;

- Figure 7 is a part view of the two elements of the structure prior to assembly, considered along the longitudinal sides of the said elements;

- Figure 8 is a view corresponding to Figure 7 after assembly of the two structural elements.

Each panel denoted in its entirety by (P) is intended, after assembly, to produce a swimming pool, without excluding other applications. Each panel (P) consists of an independent modular structure (1) of quadrangular overall shape. Advantageously, and as is apparent from the teaching of Patent FR 2 765 909, each structure has a flat surface (1a) and a peripheral assembly and rigidifying surround consisting of two vertical flanges (1b) and (1c) and two horizontal flanges (1d) and (1e). By way of nonlimiting indication, the height of each structural element (1) is roughly equal to four times its width.

The structures are assembled with one another at the vertical flanges (1b) and (1c) which have complementary arrangements able to allow two structural elements (1) to be assembled instantly in juxtaposition, at the same time sealing them along the side of the flat face (1a).

According to an underlying feature of the invention, the complementary assembly arrangements are selected, on the one hand, to allow automatic fixing of the structural elements under a bearing force exerted in a plane parallel to the vertical flanges and, at the same time, to provide sealing in combination with a profiled form produced over the entire height of the structural elements at the connection between the flanges (1b) and (1c) and the flat surface (1a).

These complementary self-fixing arrangements consist, in the case of the flange (1c), of tabs (1f) formed in the thickness of the said flange. The anchoring tabs (1f) result from two parallel cut-outs (1f1) and (1f2)

formed at right angles from the free longitudinal edge of the flange (1c). The length of the tabs (1f) is less than the width (1c) and also slightly less than the depth of the cut-outs (1f1) and (1f2). These tabs (1f) are intended to be engaged in complementary centring and guiding shapes (1g) exhibited by the other flange (1b).

These centring and guiding forms (1g) constitute sleeves delimiting an internal cross section corresponding roughly to that of the tabs (1f). The sleeves (1g) are formed as an overspill from the bearing surface of the flange (1b) and starting from its free longitudinal edge.

Each of the tabs (1f) has, on its external face, anchoring roughnesses (1f3) able to collaborate with complementary roughnesses (1g1) after engagement in the internal section of the sleeve (1g). For this purpose, the roughnesses (1g1) are formed directly on the part of the flange (1b) delimited by the lateral edges of the sleeve (1g).

The anchoring roughnesses (1f3) and (1g1) consist of a number of straight and parallel very closely-packed teeth of the gullet tooth type.

As shown particularly in Figures 5 and 6, when the tabs (1f3) have been engaged in the internal section of the sleeves (1g), the sets of teeth (1f3) and (1g1) engage and imbricate in one another through a wedging effect, it being emphasized that the thickness of the anchoring tabs (1f) is very substantially equal to the width of the internal section of the sleeve (1g).

To assemble the structural elements (1) all that is required is for them to be placed facing each other, as shown in Figures 3 and 5, in a position in which the tabs (1f) and the sleeve (1g) correspond, and for a

bearing force to be exerted in a plane parallel to the vertical flanges. This results in two opposing forces following the imbrication of the sets of teeth, and this has a tendency to cause the flanges (1b) and (1c) of the superposed adjacent structural elements (1) to be pressed perfectly together under the effect of the elasticity of the tongues.

This assembly may be performed manually or mechanically, automatically, by any known and appropriate means.

To facilitate assembly, in general, the width of the anchoring tabs (1f) is less than the width of the internal section of the sleeve (1g). However, to allow perfect heightwise adjustment of the structural elements, the sleeve (1g) situated at the upper part of the structure, considered in a vertical position and from the side of the upper flange (1d) to which the liner is fixed, has an internal section the width of which corresponds to the width of the tabs (1f).

Quite obviously, the structure (1) of the panel is produced, in its overall design, in the way known, for example, from the teaching of the aforementioned Patent FR 2 765 909. Thus, the vertical flanges (1b) (1c) have, at their upper and lower ends, cut-outs (1h) for the engagement of a stiffening rod able to be profiled to order. The vertical flanges may also have holes (1m) for the fixing of stays and for the passage of assembly members for connecting together several modules each resulting from the assembly of several panels (1) under the conditions mentioned.

Likewise, articulation arrangements, formed, for example, by a reduction in thickness forming ribs, may be made at the assembly flanges (1b) and (1c) to allow the structural elements to be oriented angularly in the case of a swimming pool of special shape.

The collection of structural elements (1) as defined, with the complementary anchoring means, is advantageously obtained by injection moulding of a plastic.

Likewise, according to another important feature, the face (1i) of the panel, opposite the face (1a) receiving the liner, may have stiffening ribs and have arrangements for fixing, in an attached manner, an independent reinforcing element (2) which acts as a hollow shaft.

If reference is made to the teachings of Patent FR 2 765 909, the face (1i) of the structural element (1) exhibits vertically two rows of studs (1j) produced parallel and close to the vertical assembly flanges (1b) and (1c). The studs (1j) are intended to collaborate with necked apertures (2a) exhibited by each of the bearing flanges (2b) and (2c) of the reinforcing element (2).

It will be recalled in this regard that the elements (2) have a right-angled top rim (2e) in communication with a vertical chute (2d). The chute (2d) is intended to receive concrete, as is the right-angled rim (2e) after the structural elements (1) have been assembled, to constitute a wall tie. The width of the reinforcing elements (2) is very substantially equal to the width considered between the internal faces of the assembly flanges (1b) and (1c) of the structural element (1). It will also be recalled that each stud (1j) has a head and a centring part collaborating with the necked apertures (2a) of the reinforcing element (2).

According to another feature, in order to ensure the sealing of the structural elements (1) after assembly under the conditions indicated above, that is to say after the toothed anchoring tabs (1f) have been engaged

in the complementary toothed sleeves (1g), a bead (1k) is formed over the entire height of the vertical flanges (1b) and (1c) at the part where they connect with the flat face (1a) of the structure (1). This bead (1k) is the result of an additional thickness of material so as to constitute a sealing profile once the toothed tabs (1f) have imbricated in the complementary sleeves (1g).

The advantages are clearly apparent from the description, and the following are particularly recalled and emphasized:

- the ease of assembly of the structural elements;
- the quality of the assembly obtained, which makes it possible to have perfect flatness;
- the sealing of the structural elements with respect to each other;
- the possibility of assembling several structural elements to constitute, for example, a panel of predetermined width using any automatic method, or entirely manually.